CLAIMS

1. An electromechanical transducer comprising a stator having a plurality of coils and a magnetic assembly having a plurality of magnetic poles there being flux linkage between the coils and the magnetic poles, wherein the stator and the magnetic assembly are arranged for relative linear movement and at least the plurality of coils is arranged to describe a helical path about the axis of the transducer whereby the magnetic circuit includes a helical component.

2. The electromechanical transducer as claimed in claim 1, wherein the stator includes a plurality of core elements on which the plurality of coils are mounted and associated pole pieces.

3. The electromechanical transducer of ~~claims 1 or 2~~ claim 2, wherein a magnetic circuit member is provided on the side of the magnetic assembly opposite to the side of the magnetic assembly facing the stator.

4. The electromechanical transducer of claim 3, wherein the magnetic circuit member is integral with the rotor and moves as part of the rotor.

5. The electromechanical transducer of ~~any one of claims 1 to 4~~ claim 1, wherein the plurality of coils of the stator and the plurality of magnetic poles of the magnetic assembly are arranged to describe helical paths about the axis of the transducer.

6. The electromechanical transducer as claimed in claim 5, wherein

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the angle of the helical path of the plurality of coils is different to the angle of the helical path of the plurality of magnetic poles of the magnetic assembly.

7. The electromechanical transducer as claimed in ~~any one of the preceding claims~~ claim 1, wherein holding means are additionally provided to constrain at least rotational relative movement between the magnetic assembly and the stator.

8. The electromechanical transducer of claim 7, wherein the holding means is in the form of one or more spiral springs.

9. The electromechanical transducer of any ~~one of claims 1 to 6~~ claim 1, wherein two transducers of opposite handedness are coupled thereby constraining rotational movement of the magnetic assemblies relative to the stator.

10. The electromechanical transducer as claimed in ~~any one of claims 2 to 9~~ claim 2, wherein at least one of the plurality of core elements and the associated pole pieces of the stator, the magnetic circuit member, and intervening segments interposed between the magnetic poles of the rotor consists of high permeability material.

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11. The electromechanical transducer as claimed in ~~any one of the preceding claims~~ claim 1, wherein at least one of the stator, the magnetic assembly and the magnetic circuit member consists of a plurality of laminations stacked together.

12. The electromechanical transducer of claim 11, wherein the planes of the individual laminations describe a helical path about the axis of

the transducer.

13. The electromechanical transducer of any ~~one of the preceding claims~~ claim 1, wherein the magnetic assembly consists of a single component having isotropic magnetisation characteristics whereby the magnetic assembly has a non-binary magnetic field distribution.

14. The electromechanical transducer of any ~~one of the preceding claims~~ claim 1, further including a torque transducer for measuring the axial force generated by the electromechanical transducer.

15. The electromechanical transducer of any ~~one of the preceding claims~~ claim 1, wherein the rotor does not form a closed cylinder.

16. A compressor having an electromechanical transducer as claimed in ~~any one of the preceding claims~~ claim 1 connected to a piston and cylinder arrangement.

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